Operation of the Lower Granite Dam Adult Trap, 2007

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Report of research by

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Division of Fish and Wildlife
Bonneville Power Administration
U.S. Department of Energy
P.O. Box 3621
Portland, Oregon 97208-3621
Contract 29545
Project 200500200

January 2008

EXECUTIVE SUMMARY

During 2007 we operated the adult salmonid trap at Lower Granite Dam from 1 March through 21 November, except during a short summer period when water temperatures were too high to safely handle fish. We collected and handled a total of 29,110 steelhead *Oncorhynchus mykiss* and radio-tagged 45 of the hatchery steelhead. We took scale samples from 4,232 spring/summer Chinook salmon *O. tshawytscha* for age and genetic analysis. We collected and handled a total of 4,741 fall Chinook salmon. Of those fish, 1,436 adults and 1,362 jacks were transported to Lyons Ferry Hatchery on the Snake River in Washington. In addition, 567 adults and 317 jacks were transported to the Nez Perce Tribal Hatchery on the Clearwater River in Idaho. The remaining 1,059 fall Chinook salmon were passed upstream. Scales samples were taken from 635 PIT-tagged fall Chinook salmon that were collected by the sort-by-code system.

CONTENTS

INTRODUCTION

Collection and sampling of adult salmonids at Lower Granite Dam, the furthest upstream Snake River dam with adult fish passage facilities, is an integral part of many studies. Use of the adult trap began in 1975 when Lower Granite Dam was completed (Harmon 2003), with operation conducted primarily by NOAA Fisheries staff, in cooperation with other agencies. Demands on use of the Lower Granite Dam adult trap have increased in recent years and are expected to continue to increase. To meet this increased demand, the adult trapping facility was remodeled during winter 2006-2007 and used for the first time during the 2007 adult migration. Current uses of the Lower Granite Dam adult trap include broodstock collection of fall Chinook salmon *Oncorhynchus tshawytscha*, run-reconstruction sampling, sampling of fish tagged with passive integrated transponder (PIT) tags from transportation and life history studies, and radiotelemetry studies (with both tagging and tag removal conducted at the adult trap).

Operation of the Lower Granite Dam adult trap provides the following benefits to listed stocks:

1) Reduces risks to the fall Chinook salmon ESU by improving hatchery practices (i.e., providing the ability to collect and use natural-origin fish for broodstock in order to improve the integration between natural-origin and hatchery-origin fish).
2) Jump-starts fall Chinook salmon production in underutilized areas of the Clearwater Basin by providing natural-origin fish collected at the trap.
3) Reduces risks to ESUs from atypical straying of hatchery-origin fish from areas outside the Snake River Basin (i.e., allows the removal of unusual numbers of stray fish).
4) Provides information on age-class distribution and hatchery/wild composition for spring/summer Chinook salmon and steelhead *O. mykiss* returns to improve understanding of ESU status, and provides critical information needed for run-reconstructions.
5) Provides critical fall Chinook salmon life history information (from scale samples) to better manage this stock.

The adult trap at Lower Granite Dam has been operated for many years; however, the Bonneville Power Administration (BPA) began funding trap operations in mid-2005 (Harmon 2006, 2007). Here we report on adult trap operations for 2007.

METHODS

The adult salmonid trap is located adjacent to the south shore adult fish ladder at Lower Granite Dam on the Snake River at river kilometer 695 (from the mouth of the Columbia River). A complete description of the adult trap and its operation was reported by Harmon (2003). When in operation, a gate is rotated across the fish ladder to block upstream fish passage. Fish then enter the trap attraction pool and pass through pipes with coded-wire-tag (CWT) and PIT-tag detectors. Tagged fish are then diverted to a holding area (for PIT tagged fish, only those selected by tag code), while non-tagged adults continue through the pipes to the exit ladder where they re-enter the main fish ladder. Diversion gates can also be set to sample the run-at-large at a pre-selected sample rate.

The trap has a gravity-flow dewatering system that allows fish to pass directly from the holding area to an anesthetic tank without handling, which reduces stress on the fish. Fish are sedated with clove oil and inspected, and sample data are collected and recorded. Fish are then placed either in a freshwater recovery tank for release back to the fish ladder, or into holding tanks for eventual transfer to trucks to be hauled from the facility.

The adult trap is generally operated 7 d/week, 24 h/d during the adult migration period, from early March through November each year, except during short periods in the summer when water temperatures are too high to safely handle fish.

RESULTS AND DISCUSSION

The Lower Granite Dam adult trap was remodeled during winter of 2006-2007. Work was contracted through the U.S. Army Corps of Engineers, with funding provided by BPA. Modifications to the trap addressed the need for increased holding capacity for fall Chinook salmon broodstock collection and a larger work area, so workers could sample a minimum of 20% of the fall Chinook and steelhead runs. Holding capacity was increased by adding 4 additional holding tanks that are approximately one and one-half times larger than the original 2 tanks. The original tanks were also modified, but their holding capacity was not increased.

The work area was expanded substantially: the size of the main anesthetic tank and recovery tank were increased, and two additional anesthetic tanks were installed. These modifications now make it feasible to handle a minimum of 20% of the fall steelhead and fall Chinook migrations at current run sizes. However, when the Lower Granite forebay is at minimum operating levels, as it is during early September, there is only enough water available to use 2 of the new holding tanks. The Corps of Engineers is working to increase the water supply so that all tanks can be used in the future.

During 2007 we operated the adult trap from 1 March to 21 November, except during the period of 23 July to 31 August when the trap was shut down because of high water temperatures. Steelhead were monitored from 1 March to 30 April with the sample rate for trapping adults set at 13%. Spring and summer Chinook salmon were monitored at a 10% sample rate from 1 May to 23 July. From 1 September to 21 November, fall Chinook salmon and steelhead were monitored with the sample rate set at 20%.

Samples were taken automatically four times an hour, 24 h/d for the entire trapping period. In addition to periodic samples of the run at large, we also collected PIT-tagged fall Chinook salmon that had been tagged as juveniles using the sort-by-code system. Sampled fish were inspected for species, lengths, injuries, brands, VI-tags, PIT-tags, and fin-clips. Scale samples were taken on some steelhead and fall Chinook salmon. Scale samples were also taken from all spring and summer Chinook salmon. Fall Chinook salmon collected at the trap and transported to hatcheries were inoculated with erythromycin and their opercula punched for identification.

The following data is preliminary and will be further analyzed by the various researchers from other agencies for which the data were collected. A total of 29,110 steelhead were collected and handled during the sampling period (Table 1). Of those fish, 1,826 were sampled during spring and 27,284 were sampled during fall. Data taken from these fish will be analyzed to evaluate the A- and B-run segments as well as the hatchery/wild composition of the run. Data will be analyzed and reported by the Idaho Department of Fish and Game (Bill Horton, IDFG, personal communication). No freeze brands were observed during 2007.

Table 1. Number of adult salmonids collected and handled at the Lower Granite Adult trap during 2007.

Species	Number collected
Spring Chinook	3,220
Summer Chinook	1,012
Fall Chinook	4,741
Steelhead	29,110

We also collected and handled 3,220 spring Chinook salmon and 1,012 summer Chinook salmon (Table 1). Scale samples were taken from all fish and will be analyzed by IDFG. Age structure and genetic analysis will be determined from the scale samples. Information on these analyses will be available from IDFG (Tim Copeland, IDFG, personal communication).

We radio-tagged 45 hatchery steelhead with adipose fins intact for the USFWS. Information about this study is available from the USFWS (Jody Brostrom, USFWS, Dworshak National Fish Hatchery, personal communication).

We collected and handled a total of 4,741 fall Chinook salmon (Table 1). Of those fish, 1,436 adults and 1,362 jacks were transported to Lyons Ferry Hatchery on the Snake River in Washington. In addition, 567 adults and 317 jacks were transported to the Nez Perce Tribal Hatchery on the Clearwater River in Idaho. The remaining 1,059 fall Chinook salmon were passed upstream.

Fall Chinook salmon run reconstruction and hatchery data taken from the 20% sample, and data collected from fish transported to Lyons Ferry Hatchery and the Nez Perce Tribal Hatchery have not been finalized, but will be available in the future from the Washington Department of Wildlife (Debbie Milks, WDFW, personal communication). Scales samples were taken from 635 PIT-tagged fall Chinook salmon that were collected by the sort-by-code system. More detailed information on this study is available from the National Marine Fisheries Service (Doug Marsh, NMFS, personal communication).

ACKNOWLEDGMENTS

We thank the U.S. Army Corps of Engineers for providing maintenance on the Lower Granite Dam adult trap.

REFERENCES

Harmon, J. R. 2003. A trap for handling adult anadromous salmonids at Lower Granite Dam on the Snake River Washington. North American Journal of Fisheries Management 23:989-992.

Harmon, J. R. 2006. Operation of the Lower Granite Dam Adult Trap, 2005. Report of research prepared for U.S. Department of Energy, Bonneville Power Administration, Division of Fish and Wildlife, Project 200500200.

Harmon, J. R. 2007. Operation of the Lower Granite Dam Adult Trap, 2006. Report of research prepared for U.S. Department of Energy, Bonneville Power Administration, Division of Fish and Wildlife, Project 200500200.